Report on Outcomes of Completed APEC-Funded Project FWG 01/2010A - Potential Contribution of Small Pelagic Fish to Food Security Within the Asia-Pacific Region

Purpose: Information
Submitted by: Peru
Potential Contribution of Small Pelagic Fish to Food Security within the Asia-Pacific Region

Project FWG 01 / 2010A
June - 2013

APEC and Food Security

First meeting of Ministers Responsible for Food Security, Niigata, Japan, 2010

- Peru agreed to study the potential supply and use of small pelagic fish products for direct human consumption
- The Paracas Action Agenda emphasized support towards initiatives that incorporate sustainably managed small pelagic fish for human consumption

- Project FWG 01 / 2010A
Small Pelagic Fish (SPF)

* High amounts of high quality animal protein, amino acids, minerals and vitamins A and D
* Valuable source of fatty acids required for the correct development of the brain in unborn babies and infants, and prevention of cardiovascular disease (Eicosapentaenoic acid EPA and Docosahexaenoic acid DHA)
* There is a long and varied tradition of fish consumption in Asia that includes small pelagic fish an important part of daily diets

Strategic partners and sponsor economies
Aim

Contribute to the long term food security in Indonesia and Philippines by offering a sustainable source of high-quality protein at low cost, providing examples to other APEC economies.

Objectives

- Understand local consumption habits and levels of capture of small pelagic fish (SPF), and identify strategies to overcome market impediments for their consumption and novel products for human consumption.
- Share the research and management techniques for monitoring and regulating small pelagic fisheries in Peru and identify programs that could be applied in order to help manage and regulate these fisheries.
- Share the Peruvian experience with the APEC economies of Philippines and Indonesia in the following areas: (i) technology in the production of value-added products from small pelagic fish for human consumption (e.g., smoked, salted, paste, and other forms); and (ii) marketing strategies for promoting the use of small pelagic fish for human consumption.
Methods

1. Literature review
2. Observational research (ports, landing areas, processing plants and markets)
3. Analysis of fish extraction statistics
4. Surveys on human consumption habits
5. Interviews with key stakeholders
6. Visit of the representatives from Indonesia and the Philippines to Peru to exchange knowledge and experience

Results: Availability
Contribution of SPF to marine fish production from 1997 – 2010

Indonesia

The Philippines

Commercial vs Artisanal (Municipal) Fisheries in the Philippines, 1997 - 2010
Contribution of SPF to the top most productive marine fish, Indonesia 2010

- Round scads
- Skipjack tuna
- Short mackerel
- Goldstripe sardinella
- Yellowstripe scad
- Stolephorus anchovies
- Kawakawa
- Narrow-barred spanish mackerel
- Frigate tuna
- Bali sardinella
- Southern bluefin tuna
- Red snappers
- Other fish

Contribution of SPF to the top most productive marine fish, Philippines 2011

- Spotted sardinella
- Round scads
- Skipjack
- Frigate tuna
- Yellowfin tuna
- Bigeye scad
- Goldstripe sardinella
- Indian mackerel
- Stolephorus anchovies
- Slipmouth
- Other Species
Production volumes of the top SPF 2010

<table>
<thead>
<tr>
<th>Indonesia</th>
<th>Volume (MT)</th>
<th>Philippines</th>
<th>Species</th>
<th>Volume (MT)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Roundscads</td>
<td>351,216</td>
<td>1. Spotted sardinella</td>
<td>334,030</td>
<td></td>
</tr>
<tr>
<td>2. Short mackerel</td>
<td>276,110</td>
<td>2. Round scads</td>
<td>268,227</td>
<td></td>
</tr>
<tr>
<td>3. Goldstripe sardinella</td>
<td>196,067</td>
<td>3. Frigate tuna</td>
<td>149,566</td>
<td></td>
</tr>
<tr>
<td>5. Stolephorus anchovies</td>
<td>175,726</td>
<td>5. Goldstripe sardinella</td>
<td>108,015</td>
<td></td>
</tr>
<tr>
<td>6. Kawakawa</td>
<td>141,190</td>
<td>6. Indian mackerel</td>
<td>91,857</td>
<td></td>
</tr>
<tr>
<td>7. Narrow-barred Spanish mackerel</td>
<td>140,277</td>
<td>7. Stolephorus anchovies</td>
<td>80,183</td>
<td></td>
</tr>
<tr>
<td>8. Frigate tuna</td>
<td>132,733</td>
<td>8. Short mackerel</td>
<td>55,708</td>
<td></td>
</tr>
<tr>
<td>11. Redbelly yellowtail fusilier</td>
<td>59,890</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1,854,603</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Philippines</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1,290,841</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Top small pelagic fish species in Indonesia, 2010

- Round scads
- Short mackerel
- Goldstripe sardinella
- Yellowstripe scad
- Stolephorus anchovies
- Kawakawa
- Narrow-barred Spanish mackerel
- Frigate tuna
- Bali sardinella
- Jack trevallies
- Redbelly yellowtail fusilier
- Other small pelagic fish
Top small pelagic fish species in the Philippines, 2010

- Spotted sardinella: 24%
- Round scads: 19%
- Frigate tuna: 10%
- Big eye scad: 9%
- Goldstripe sardinella: 8%
- Indian mackerel: 6%
- Stolephorus anchovies: 6%
- Short mackerel: 4%
- Yellowstripe scad: 3%
- Kawakawa: 3%
- Other small pelagic fish: 8%

Production of the top SPF, Indonesia 1997 - 2010

<table>
<thead>
<tr>
<th>Volume (MT)</th>
</tr>
</thead>
<tbody>
<tr>
<td>400,000</td>
</tr>
<tr>
<td>350,000</td>
</tr>
<tr>
<td>300,000</td>
</tr>
<tr>
<td>250,000</td>
</tr>
<tr>
<td>200,000</td>
</tr>
<tr>
<td>150,000</td>
</tr>
<tr>
<td>100,000</td>
</tr>
<tr>
<td>50,000</td>
</tr>
<tr>
<td>0</td>
</tr>
</tbody>
</table>

- Redbelly yellowtail fusilier
- Yellowstripe scad
- Jack trevallies
- Bigeye scad
- Goldstripe sardinella
- Bali sardinella
- Stolephorus anchovies
- Kawakawa
- Short mackerel
- Narrow-barred Spanish mackerel
- Frigate tuna
Production of the top SPF, Philippines 1997 - 2010

Production of the top SPF
Commercial vs Artisanal, Philippines 1997 - 2010
Out of the 11 fishing management areas for SPF, 4 are overexploited, and some of the main areas have already collapsed.

Stocks of the Bali sardinella, Indian mackerel, short mackerel, round scads and the goldstripe sardinella are overexploited.

Closures for SPF have not been possible, the population of fishermen exceeds 2.2 million people, so there is great opposition towards measures that reduce fishing.

Political will is key for the successful implementation of management measures such as fishing closures which are crucial for the sustainability of the SPF resources.

Most of the coastal fishing grounds are already overexploited.

Iconic species of food security such as scads, sardines and anchovies have declined due to poor management, resulting in sharp price increases adding further stress to food security.

Management tools such as closures are in use since 2011 with successful results recovering sardine stocks.

It took a long process of education and strong political will to achieve this closure, more work needs to be done to strengthen the sustainability of all small pelagics.
Surveys conducted to understand consumption habits of SPF

<table>
<thead>
<tr>
<th>Survey group</th>
<th>Indonesia</th>
<th>The Philippines</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coastal</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Fishing community</td>
<td>24</td>
<td>44</td>
<td>68</td>
</tr>
<tr>
<td>- Non-fishing community</td>
<td>27</td>
<td>85</td>
<td>112</td>
</tr>
<tr>
<td>Non-coastal</td>
<td>1</td>
<td>35</td>
<td>36</td>
</tr>
<tr>
<td>Total</td>
<td>52</td>
<td>164</td>
<td>216</td>
</tr>
</tbody>
</table>

Fish consumption habits in Indonesia and the Philippines

- All of the interviewees consumed fish
- Those who consume fish daily have the habit of eating fish 3 times a day everyday

Overall consumption frequency

- Daily: 24%
- Weekly: 74%
- Monthly: 2%
- Annually: 2%
Fish as staple food

Coastal Communities
- Indonesia, 9% consider fish a staple food
- Philippines, 28% consider fish a staple food

However, frequency of consumption is very high, with a high proportion of respondents eating fish daily, there might be a misconception on the meaning of staple food.

Non-coastal communities (Philippines)
- 82% mentioned fish as a staple food, though their consumption frequency was not reported that high (it could be due to the daily use of fish sauce for seasoning and the habit of having fish chowder as a starter for meals).

Fish as source of animal protein

Coastal communities
- Indonesia, 64% have fish as main source of animal protein
- Philippines, 74% have fish as main source of animal protein

Non-coastal communities (Philippines)
- The top source of animal protein was pork, 29%, followed by fish with 18%
The monthly category was not mentioned. People in the cities either consume fish often consume it very little. In coastal communities fish consumption is a very common habit. The results from either coastal or non-coastal areas remain quite high.

### Preferred species

#### Coastal
- Indonesia:
  - Small tuna and the Bali sardinella
- Philippines:
  - Small tuna and round scads

#### Non-coastal (Philippines)
- Bigeye tuna*, round scads, Indian mackerel and small tuna.

* Photos: Randall, J.E. (Fishbase)
Coastal communities

Indonesia:
* Small tuna, narrow barred Spanish mackerel and round scads

Philippines:
* Round scads, sardines and big eye scads

Non-coastal communities (Philippines)
* Bigeye scad, round scads, Stolephorus anchovies and siganid*

→ The reason that guides choice for fish is taste, followed by availability and affordability

Photos: Randall, J.E (Fishbase)
### Consumption of Fish and Fishery Products, Indonesia and the Philippines

#### Total fish consumption per year by each economy

<table>
<thead>
<tr>
<th>Economy</th>
<th>Population (2010)</th>
<th>Fish Cons. per capita (kg/yr)</th>
<th>Total Consumption (tonnes/yr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indonesia</td>
<td>237'641,326</td>
<td>30 (MMAF, 2011)</td>
<td>7'129,240</td>
</tr>
<tr>
<td>Philippines</td>
<td>92'340,000</td>
<td>38 (BFAR, 2003)</td>
<td>3'508,920</td>
</tr>
</tbody>
</table>

#### Total fish supply per year by each economy (2009)

<table>
<thead>
<tr>
<th>Economy</th>
<th>Capture (tonnes/yr)</th>
<th>Import (tonnes/yr)</th>
<th>Export (tonnes/yr)</th>
<th>Fish supply (tonnes/yr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indonesia</td>
<td>6,832,789</td>
<td>331,893</td>
<td>220,372</td>
<td>6'944,310</td>
</tr>
<tr>
<td>Philippines</td>
<td>3'339,851</td>
<td>202,157</td>
<td>181,322</td>
<td>3'360,686</td>
</tr>
</tbody>
</table>

- In both Indonesia and the Philippines there is a fish deficit; demand for fish exceeds their supply.
Artisanal Products

Steamed

Smoke
dried

Grille

Marinate

Fish Crackers
Display of Dry Fish

Local Market

Supermarket

Fish Balls – Artisanal and Industrial
Novel Products

Use of Anchovies
Use of Anchovies

Limitations to food security
BOTH economies are fragmented by their archipelagic nature

Indonesia → 17,000 islands

Philippines → 7,000 islands

→ This restricts the distribution channels and physical access to SPF resources throughout the case study economies

Variable supply of raw materials

- Highly seasonal
- Unpredictable
- Processing plants import raw materials to sustain their production in times of scarcity
- The demand is not completely satisfied due to the scarcity of the SPF resources
Small pelagic fish are generally readily available, cheap and freshly caught as food, especially in the coastal communities and main cities.

Artisanal processed SPF are common, highly affordable, available and extensively used.

Hence the use of value-added products from SPF to tackle food insecurity should target the vulnerable populations in isolated and landlocked areas where fresh and artisanal products are scarce.

Poor handling affects the supply of SPF available for value added products of direct human consumption.
Lack of adequate cold storage

- Storage needs to be improved further with on-board chilling. The practice is not extensive in Indonesia or the Philippines due to the low monetary value of SPF and the extra investment that this requires.
- In Indonesia the number of vessels that keep cold storages for small pelagic fish is too low and in the Philippines it could be improved; both economies are taking measures to introduce this practice in the sector.
- Cold storages should be the basic minimum requirement for fishing vessels of SPF for direct human consumption. SPF are fragile and require cold storage to avoid deterioration and rancidity.

Increasing demand of SPF as feed for mariculture and bait
Opportunities to food security

Opportunities

- Cultural preference for strong flavoured fish like SPF in Asia-Pacific
- A wide array of value-added products from SPF exist in the market
- Production of SPF follows a continuous increase for the last decade, indicating availability; it can be very high during peak seasons, when raw materials can be collected given adequate cold storage
- Artisanal value-added products of SPF are of key cultural value and employ a great majority of the population of small-scale fishing communities, where women play an important role
- There is a large potential workforce to develop a value-added industry of small pelagics in both Indonesia and the Philippines
There is a clear fish production deficit for direct human consumption in Indonesia and the Philippines that could be satisfied by surplus SPF producing economies like Peru.

This will not compromise the resources available for domestic direct human consumption in Peru and it will not affect or compete with other related industries for raw materials.

Peru satisfies its domestic demand for direct human consumption of Peruvian anchovies with <2% of the 26% of available biomass, leaving 24% available to supply international markets without the need to increase fishing effort or to divert resources from indirect human consumption.

Peru satisfies its domestic demand for direct human consumption with <2% of the biomass of Peruvian anchovies, the remaining 24% is available to introduce this resource to new international markets of direct human consumption.

<table>
<thead>
<tr>
<th>Year</th>
<th>0 – 10 miles (Direct human consumption)</th>
<th>&gt;10 miles (Indirect human consumption)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>13%</td>
<td>87%</td>
</tr>
<tr>
<td>2010</td>
<td>46%</td>
<td>54%</td>
</tr>
<tr>
<td>2011</td>
<td>23%</td>
<td>77%</td>
</tr>
<tr>
<td>2012</td>
<td>25%</td>
<td>75%</td>
</tr>
<tr>
<td>Average</td>
<td>26.6%</td>
<td>73.4%</td>
</tr>
</tbody>
</table>
SPF Products from Peru: Matured anchovies

SPF Products from Peru: Canned
SPF Products from Peru: Canned

SPF Products from Peru: Canned
Production of SPF is high with increasing trends in Indonesia and the Philippines, however much of their stocks are overexploited and fail to cover internal consumption demands due to the large size of their human populations.

Taste and preference for small pelagics are culturally printed in the population so economies with surplus production of SPF like Peru could aid to satisfy this demand through trade.
Conclusions

* The greatest limitation for small pelagics to tackle food insecurity in Asia-Pacific is posed by the dissected territories of Indonesia and the Philippines, a huge challenge for distribution to the most isolated and vulnerable populations.

* Under this scenario, affordable added-value products SPF could be a perfect alternative as packaging could ease portability and reduce fish losses in distribution chains; however price issues need to be assessed as value-added products are generally more expensive and vulnerable populations are usually among the poorest sectors of society.

Next Steps

1. A 2nd stage of the project should be considered to investigate the limitations that archipelagic and mountainous territories pose to food security and identify possible solutions
2. Organize a workshop on Fisheries Statistics for SPF directed by Peru to build capacity in Indonesia and the Philippines
3. Elaborate a set of guidelines for MCS that apply to artisanal fisheries in the APEC region
4. Training on postharvest by the Peruvian Institute of Fish Technology (ITP) to Indonesia and the Philippines
5. Capacity building and transfer of knowledge and technology in seaweed products from Indonesia and the Philippines to Peru
6. Research collaborations in topics related to: stock assessment, abundance alternation anchovies/sardines, mariculture, aquaculture, seaweeds, algal blooms
SPECIAL THANKS TO:

Mr. Noel Barut, Ms. Eunice Gasmin, Ms. Sitti Hamdiyah, Mr. Duto Nugroho, Mr. Suwarso,
Montaña Foods Coor, Y & I Fishing, BFAR, NFRDI, - PHILIPPINES
CV Pasific Harvest, PT Indohama, MMAF RCFMC – INDONESIA
IMARPE, ITP, SANIPES, PRODUCE, iPrisco, TASA – PERU
All the interviewees, NFRDI enumerators and staff, RCFMC staff

• MARAMING SALAMAT PO!
• TERIMA KASIH!
• GRACIAS!